REMARKS

The Office Action dated May 30, 2003, has been received and carefully noted. The preceding amendments and the following remarks are submitted as a full and complete response thereto. Claims 2, 4, 6 and 8 are amended. No new matter is added. Claims 10, 11, and 15 are cancelled. In view of following remarks, Applicants request the favorable consideration of claims 1-9, and 12-14.

Claims 2, 4, and 8 are objected for being in improper dependent form for failing to further limit the subject matter of the previous claim. Claims 2, 4, and 8 are amended to more clearly recite the features of claimed invention. No new matter is added. The Applicants submit that each dependent claim properly limits the previous claim to which it depends. Therefore, Applicants respectfully request the withdrawal of the objection to claims 2, 4, and 8.

Claims 1-5, 7, 8, 9, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato et al. (U.S. Patent No, 5, 861,601, hereinafter "Sato") in view of Otsubo et al (U.S. Patent No. 4, 985,109, hereinafter "Otsubo"). The Office Action takes the position that the combination of Sato and Otsubo teach or suggest all the features recited in claims 1-5, 7, 8, 9, 12, and 13. Applicants respectfully disagree.

Claim 1, upon which claims 2-5 depend, is directed to a plasma processing apparatus for processing an object to be processed using a plasma. The apparatus includes a processing chamber, a microwave radiating antenna, and a dielectric body. The processing chamber defines a processing cavity for containing an object to be processed and a process gas therein. The microwave radiating antenna has a microwave radiating surface for radiating a microwave in order to excite a plasma in the processing cavity. The dielectric body is provided so as to be opposed to the microwave radiating surface. A distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, is determined to be in a range satisfying an inequality, $0.7\times n/4 \leqq D \leqq 1.3\times n/4$ (n being a natural number). A standing wave of the microwave is formed between the microwave radiating surface and a plasma exciting surface, thereby exciting a plasma at the plasma exciting surface by being supplied with energy from the standing wave of the microwave, the plasma exciting surface substantially coinciding

with the surface of the dielectric body facing away from the microwave radiating surface.

Claim 7 recites a plasma processing method for processing an object to be processed using a plasma. The method includes steps of: putting an object to be processed and a process gas into a processing cavity defined in a processing chamber; radiating a microwave for exciting a plasma from a microwave radiating antenna having a microwave radiating surface to the processing cavity; providing a dielectric body so as to be opposed to the microwave radiating surface; and determining a distance D between the microwave radiating surface and a surface of the dielectric body facing away from the microwave radiating surface, which is represented with a wavelength of the microwave being a distance unit, to be in a range satisfying an inequality, $0.7\times n/4 \leqq D \leqq 1.3\times n/4$ (n being a natural number). A standing wave of the microwave is formed between the microwave radiating surface and a plasma exciting surface, thereby exciting a plasma at the plasma exciting surface by being supplied with energy from the standing wave of the microwave, the plasma exciting surface substantially coinciding with the surface of the dielectric body facing away from the microwave radiating surface.

According to claimed configuration, the standing wave of the microwave is formed between the microwave radiating surface and the surface of the dielectric body facing away form the microwave radiating surface. Therefore a standing wave is not formed in the plasma or in the vicinity of the surface of a wafer. This feature nor the benefits provided by the claimed invention is neither taught nor suggested by the applied references.

Sato discloses a microwave plasma processing apparatus of an electron cyclotron resonance (ECR) system. In the ECR system, microwaves are not reflected around the lower surface of a quartz plate, which forms a microwave introduction window because only a weak plasma is produced around a lower surface of the quartz plate. Therefore, no standing wave of the microwave is formed between a slot antenna and the quartz plate.

Otsubo discloses a plasma processing apparatus that generates plasma according to a cavity resonance system. However, Otsubo fails to disclose that a standing wave of a microwave is formed between the microwave radiating surface of an antenna and a lower surface of a quartz plate by determining the distance

therebetween based on the wavelength of the microwave, as defined by the claimed invention. In contrast, the standing wave of the microwave is generated between the slot plate 5 and the stage 7 (See Figures 13 and 14, Page 19 Lines 33-34).

In other words, the standing wave is not generated between the slot plate 5 and the lower surface of the quartz plate 4. As a result, Otsubo fails to teach or suggest the feature of a standing wave of a microwave is formed between the microwave radiating surface of an antenna and a lower surface of a quartz plate by determining the distance therebetween based on the wavelength of the microwave. Therefore, Applicants respectfully submit that Otsubo fails to cure the deficiencies of Sato. Accordingly, the combination of Sato and Otsubo fail to teach or suggest all the features recited in claims 1 and 7. Thus, Applicants respectfully request the withdrawal of the rejection of claims 1 and 7 under 35 U.S.C. 103(a).

Claims 2-5, 8, 9, 12, and 13 depend upon claims 1 and 7. It is submitted that these claims recite subject matter that is patentable for at least the reasons mentioned above. Therefore, Applicants respectfully request the withdrawal of the rejection of claims 2-5, 8, 9, 12 and 13.

Claims 6, 10, 11, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato in view of Tsuchihashi, and Masaaki et al. (U.S. Patent No. 6,109,208, hereinafter "Masaaki"). The Office Action takes the position that the combination of the references teach all the features recited in claims 6, 10, 11, and 15.

Claims 10, 11, and 15 are cancelled. Therefore, the rejection of claims 10, 11, and 15 is moot. Claim 6 is amended to depend upon independent claim 1. It is submitted that claim 1 recites subject matter that is patentable at least for the reasons mentioned above. Accordingly, it is submitted that amended claim 6 likewise recites subject matter that is neither taught nor suggested by the applied references. Therefore, Applicants request the withdrawal of the rejection of claim 6 under 35 U.S.C. 103(a).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato and Otsubo in view of Tsuchihashi and Matsaaki. The Office Action takes the position that the combination of cited references teach all the features recited in claims 14, which depends upon independent claim 7. Applicants respectfully traverse this rejection.

The combination of cited references fails to teach or suggest the feature of a standing wave of the microwave being formed between the microwave radiating surface and a plasma exciting surface, thereby exciting a plasma at the plasma exciting surface by being supplied with energy from the standing wave of the microwave, the plasma exciting surface substantially coinciding with the surface of the dielectric body facing away from the microwave radiating surface.

As mentioned above, Otsubo merely discloses that the standing wave of the microwave is generated between the slot plate 5 and the stage 7. Thus, the standing wave is not generated between the slot plate and the lower surface of the quartz plate. As a result, Applicants respectfully request the withdrawal of rejection of claim 14 under 35 U.S.C. 103(a).

In view of the above amendments and distinctions between the claimed invention and the applied references, Applicants respectfully request the withdrawal of the rejection of claims 1-9, and 12-14. Claims 2, 4, 6 and 8 are amended. Claims 10, 11, and 15 are cancelled. No new matter is presented. Therefore, Applicants submit that the application is now in condition for allowance with claims 1-9 and 12-14 contained therein.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account No. 01-2300.

Respectfully submitted,

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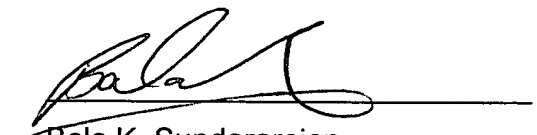

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